

## Tex-922-K, Calibrating Asphalt Distribution Equipment

### Overview

Effective: August 1999 – October 2004.

This three-part procedure is a method for calibrating asphalt distributor tanks, verifying asphalt distributor tank calibrations, and ensuring uniform distribution across a spray bar.

### Part I, Asphalt Distributor Tank Calibration

The following method describes calibrating asphalt distribution tanks.

### Apparatus

The following apparatus is required:

- ◆ water meter, calibrated annually, readable to within 4 L (1 gal.)
- ◆ bucket, calibrated to measure 19 L (5 gal.)
- ◆ strapping rod
- ◆ tape measure or ruler
- ◆ water-finding paste (optional)
- ◆ spirit level.

NOTE: If a water meter is not available, use a calibrated 19 L (5 gal.) bucket to perform the distributor tank calibration.

### Verifying Water Meter

Use the following steps to verify the water meter.

Verifying Water Meter	
Step	Action
1	Fill a container with a known volume using the water meter.
2	Compare the meter reading to the known volume.
3	Reject if error is greater than 1.0%.

## Procedure

Follow these steps to calibrate the asphalt distributor tank.

Calibrating Asphalt Distributor Tanks	
Step	Action
1	Be certain the tank is reasonably clean.
2	Park the distributor tank on a level surface.
3	<ul style="list-style-type: none"> <li>◆ Level the tank longitudinally and transversely with a spirit level.</li> <li>◆ The tank may need to be re-leveled during the procedure if differential settlement occurs while filling the tank.</li> </ul>
4	Close the valve between the distributor tank and the spray bar.
5	Use the calibrated water meter to pump water into the tank in the following increments: <ul style="list-style-type: none"> <li>◆ no more than 76 L (20 gal.) increments for a tank with a capacity of 9464 L (2,500 gal.) or less</li> <li>◆ no more than 95 L (25 gal.) increments for a tank with a capacity between 9464 L (2,500 gal.) and 15,142 L (4,000 gal.)</li> <li>◆ no more than 189 L (50 gal.) increments for tanks with a capacity of greater than 15,142 L (4,000 gal.).</li> </ul> NOTE: Use Approximately 1.0% of tank capacity for calibration increments.
6	Allow the water surface to become still after each increment of water is pumped into the tank.
7	Hold the strapping rod vertically in the center of the tank.
8	<ul style="list-style-type: none"> <li>◆ Measure the depth of water on the strapping rod to the nearest 3 mm (1/8 in.) with a tape measure or ruler.</li> <li>◆ Water-finding paste will assist in accurately determining the water level.</li> </ul>
9	Record the depth measurement and the corresponding volume.
10	Continue this procedure until the tank is filled.
11	<ul style="list-style-type: none"> <li>◆ Prepare the depth vs. volume data plus the identification and description of the distributor. The Asphalt Distributor Tank Calibration (<a href="#">asphalt</a>) is an example of the format for minimum documentation when preparing the calibration report.</li> <li>◆ The calibration report must be signed by, and display the seal of, the Registered Professional Engineer, who is required to witness the calibration.</li> </ul>
12	Make a new calibration stick based on the depth vs. volume data.
13	Stamp the serial number of the tank on the stick.
14	Check this calibration stick for accuracy immediately after it is fabricated.
15	Mount the stick on the side of the distributor tank.
16	File a copy of the calibration papers in the contract file.
17	Give the original to the contractor to be carried with the distributor tank.

**CAUTION:** All water must be removed after calibrating the distributor tank or spray bar. Adding 'hot' asphalt (in excess of 100 °C [212 °F]) will cause water in the tank to boil in an explosive manner, which could result in serious injury.

## **Part II, Asphalt Distributor Tank Verification Test**

The following method describes verifying asphalt distributor tank calibrations.

### **Procedure**

Follow these steps to verify asphalt distributor tank calibration.

<b>Verifying Asphalt Distributor Tank Calibration</b>	
<b>Step</b>	<b>Action</b>
1	Obtain a copy of the most current calibration report from the contractor, relating the depth of material in the tank to its volume.
2	Check the report to verify that the tank matches the description, serial number, etc., shown on the report.
3	Check the depths on the calibration stick against the depths recorded on the calibration report.
4	<ul style="list-style-type: none"><li>◆ Check the number of points necessary to verify that the calibration is correct.</li><li>◆ Since the vast majority of measurements are generally taken in the bottom 10% and the top 10% of the volume of the tank, these are the areas of most concern.</li></ul>
5	Accept the calibration verification if the difference between each actual volume and the measurement obtained from the calibration report is within 1.5% of the total capacity of the tank.
6	If the percent error exceeds 1.5%, the distributor tank must be re-calibrated according to 'Part I, Asphalt Distributor Tank Calibration.'
7	Add a note to the "remarks" section of the tank calibration report each time a verification test is performed (See <a href="#">asphalt</a> ).
8	If the tank does not meet the requirements of the verification test, prepare documentation of the findings for future references.

## **Part III, Calibrating Spray-Bar**

The following method describes preparing, calibrating, and ensuring uniform distribution across a spray-bar.

### **Apparatus**

The following apparatus is required:

- ◆ scale capable of reading up to approximately 4000 g
- ◆ elliptical buckets, approximately 216 mm (8.5 in.) deep, with an opening of 254 x 89 mm (10 x 3.5 in.). These can be fabricated from old triaxial cells.
- ◆ plastic bags, 292 x 318 mm (11.5 x 12.5 in.)
- ◆ large rubber bands.

## Preparation

Use these steps to prepare the spray-bar for calibration.

Preparing Spray-Bar for Calibration	
Step	Action
1	Fill the distributor tank with water so the level is above the flues (approximately 757 L [200 gal.]). <ul style="list-style-type: none"> <li>◆ Asphalt can be used instead of water to perform this procedure. However, AC asphalts are not recommended due to the high temperature required to make them flow freely.</li> <li>◆ If emulsified or cutback asphalts are used instead of water, they must be heated to a temperature that will allow the asphalt to flow freely.</li> </ul>
2	Heat the water to 54.4 to 65.6 °C (130 to 150 °F).
3	Turn all nozzles so that the V-groove is 90 degrees to spray-bar.
4	Open all the valves.
5	Check to see that water is spraying freely from nozzle.
6	Clean or replace clogged nozzles.

## Procedure

The following steps detail the procedure to calibrate the spray-bar.

Calibrating Spray-Bar	
Step	Action
1	Place plastic bags inside elliptical buckets.
2	Fill each bucket (and bag) with dry aggregate or sand to prevent entrapment of air.
3	Secure each bag with a rubber band. NOTE: Omit bags if AC asphalt is used for calibration.
4	Obtain a tare weight for each bucket, bag, and rubber band.
5	Place a bucket under each nozzle to catch all the flow from that nozzle.
6	Set pump speed, etc. to setting(s) used during construction.
7	Open the spray-bar and fill the buckets 2/3 to 3/4 full.
8	Weigh each bucket and record the weight.
9	Use the procedure in the Spray Bar Calibration form ( <a href="#">spray</a> ) to calculate the percentage of deviation for each nozzle. NOTE: This deviation must not exceed $\pm 10.0\%$ .
10	<ul style="list-style-type: none"> <li>◆ Make a plot with the bucket number versus percentage deviation.</li> <li>◆ This will show the spray bar distribution and may assist in correcting deviations in nozzle outputs, suggesting that a linkage may need to be adjusted, or a nozzle may need to be replaced.</li> </ul>
11	Record all data (tare weight, gross weight, net weight and percentage deviation) with the identification and description of the distributor.
12	File the spray-bar calibration report in the contract files.

**CAUTION:** All water must be removed from the distributor tank after calibrating the spray-bar. Adding 'hot' asphalt (in excess of 100 °C [212 °F]) will cause water in the tank to boil in an explosive manner, which could result in serious injury.